ACENTECH

33 Moulton Street
Cambridge MA 02138
617 499 8000
acentech.com

December 9, 2021

Erin Hunt, AIA, LEED AP
Gensler
One Beacon Street, 3rd Floor
Boston, MA 02108
Via email: *Erin_Hunt@gensler.com*

Subject: Riverside Labs Community Noise Assessment
Weston, Mass.
Acentech Project No. P634401 (Revision 1)

Dear Erin:

Acentech conducted a community noise evaluation of the proposed Riverside Labs campus in Weston, Massachusetts. We understand that the current office buildings located at 9 and 20 Riverside Road (designated "B09" and "B20", respectively) will be converted into lab space. We also understand that building "B15" will be a parking garage, but will also contain rooftop mechanical equipment. Some equipment will be located in mechanical penthouses and other equipment will be located behind screen walls and open to the sky. There will be an Emergency Generator and Transformer on grade at the exterior of all three buildings. All existing equipment will be removed as part of this Project and replaced with new equipment.

REGULATION REVIEW

MASSACHUSETTS

According to the Massachusetts Department of Environmental Protection (MassDEP) and the Massachusetts Division of Air Quality Control (DAQC) Policy 90-001, excessive noise is defined as the condition resulting when: (1) a broadband sound source raises the noise level by 10 dB or more above the background noise, or (2) a tonal sound condition exists. Tonal sound is defined when an octave-band sound pressure level is three decibels or more higher than the adjacent octave-band sound levels.

TOWN OF WESTON

The Town of Weston sound limits are given in a recent Zoning Amendment Article 31 which was approved to apply to this project. Section VI.A.2.(f) of this Article states the following:

> *"(f) In the Office & Research and Development District B, the following requirements shall apply regarding attenuation of noise: (i) noise emanating from the property will not exceed 5 dBA above ambient at adjacent residential districts (not including overlay districts) or conservation land, including such residential districts across a public or private way between the hours of 9PM to 7AM, and will not exceed 40 dBA at the property line;"*

The Intertek report (dated August 3, 2021) determined that:

> *"The average minimum L_{90} sound levels along the western and southern property lines are higher than 35 dBA, meaning that the 5 dBA increase over these measured levels would be greater than 40 dBA sound level that is allowed. Based on this finding, the 40 dBA sound level limit at the western and southern property lines is the requirement that will govern the sound emissions for the project."*

NOISE COMPUTATIONS

Acentech developed an acoustic model to compute the sound pressure levels from all sound producing equipment for B09, B15 and B20. This model allows us to determine the individual contribution of each piece of equipment and therefore determine the amount of noise mitigation, if any, that is likely to be needed to meet the Town limits. Table 1 lists the equipment type and overall A-weighted sound power level (L_{WA}) that we have used for our study. Appendix A provides the octave band sound power levels that were used in our acoustic model. At your direction, we are using the sound power levels from B20 equipment selections for B09 and B15.

With the exception of the Cooling Towers and Emergency Generator we are using sound power levels provided by the equipment vendors. For the Cooling Tower we have determined the minimum equipment sound power levels to be compliant with the Weston limit. We have also done the same for the Emergency Generator.

TABLE 1: Summary of Equipment Sound Power Level (L_{WA})

TAG	Equipment Name	Applicable Buildings	Sound Power Level dBA re 1 pico-Watt	Notes
AHU-1, 2, 3, 4	Trane, CSAA100	B09, B15	77	1
AHU-1, 2	Innovent RTU-45K	B20	100	2
CH-1, 2	Trane, CVHF	B09, B15	n/a	3
CT-1, 2	Baltimore Aircoil Company, PT2-1212A-2N2	B09, B15	91	4
EAHU-1	Skyplume G1-ELLV-SC-49	B09, B15	83	5
EAHU-2	Greenheck CH-49	B09, B15	81	5
EAHU-1, 2	Skyplume G1-ELLV-SC-40	B20	82	6
Gen-2	Caterpillar, C18 750 eKW	B09, B15, B20	76	7
Trans-1	Cooper Power, 2001-2500	B09, B15, B20	75	8

Notes:

1) Located in Penthouse with sound path via air inlet
2) Includes sound from air inlet, compressor fans and compressors
3) Located in Penthouse with no direct sound path to the exterior
4) Low noise cooling tower to provide maximum sound power given in Table A-2[1]
5) With exhaust silencers to provide maximum sound power as given in Table A-1 with attenuation of Table A-3
6) With exhaust silencers to provide maximum sound power given in Table A-1
7) With a high performance enclosure to provide maximum sound power as given in Table A-2[1]
8) To be mitigated by exterior noise barrier with a height of 10 feet.

ACOUSTIC MODEL DESCRIPTION

The noise evaluation was performed using Cadna-A acoustic modeling software. It complies with the international standard ISO 9613-2, “Attenuation of sound during propagation outdoors -- Part 2: General method of calculation”. All equipment were modeled as acoustic point sources with uniform directivity in all directions. The ground absorption for the acoustic model was set to 0.5 given that the area is mixed acoustically hard and soft. Buildings were placed in the model to provide reflections and shielding. Acoustic screens with a height of 20 feet above the roof deck were assumed. The only ground mounted equipment were the Emergency Generator and Transformers. All results were for daytime conditions with no equipment setback assumed.

[1] The sound power levels given in Table A-2 have not been provided by any specific vendor. The project team shall procure such equipment with maximum the sound power level as given in the table.

RESULTS

Five property line receptors (R-1 through R-5) were identified to assess the Project sound levels, as located in Figure 1. Sound pressure levels due to the facility were calculated at each of these receivers.

Overall A-Weighted Sound Levels

Table 2 summarizes the resulting A-weighted sound pressure levels (SPL's) for daytime based on the noise mitigation assumption we have outlined in Table 1 and discussed further below. We have computed daytime SPL with and without the three Emergency Generators operating.

TABLE 2: Estimated Overall A-Weighted Sound Pressure Levels, dBA for Daytime
(Based on noise mitigation recommended below)

Condition	Sound Pressure Level, dBA				
	R-1	R-2	R-3	R-4	R-5
Normal Operation	34	34	39	39	38
Normal Operation with Generators	35	35	40	39	39
Weston Noise Limit	*40*				

Octave Band Sound Levels

Figure 2 is a graph of the estimated octave band sound pressure levels. We have estimated the octave band sound levels at all receptors and do not find conditions of pure tone according to MADEP requirements given above.

NOISE MITIGATION

In order to achieve the property line sound levels of 40 dBA as reported in Table 2, the Riverside Labs buildings will require the following sound mitigation:

- All Buildings with standard roof equipment with maximum sound power levels given in Table A-1.
- All Buildings with silencers on EAHU fan outlets with maximum sound power levels given in Table A-1.
- Building 15 Cooling Towers to be low noise with maximum sound power levels given in Table A-2
- All buildings Emergency Generators to be fully enclosed and equipped with exhaust mufflers. Including both of these sources, each generator should have a maximum sound power level given in Table A-2.
- Noise barrier with height of 10 feet around the Building 09 & 20 Emergency Generator and Transformer.
- Noise barrier with height of 10 feet around Building 15 transformer
- All building roof screens should provide sound attenuation performance and should be solid screen without any openings and have a surface density of at least 2 lbs./square foot or minimum of STC-25. The side facing the mechanical equipment shall be acoustically absorptive with a minimum Noise Reduction Coefficient (NRC) of 0.70.

CONCLUSIONS

With the recommended noise mitigation described above, the Project sound levels will comply with the overall A-weighted sound level limits required by the Town of Weston. The Project octave band sound pressure levels not violate the MADEP pure tone requirement.

(Continued)

Please contact me at 617-499-8058 or mbahtiarian@acentech.com with any questions or comments.

Sincerely,

ACENTECH INCORPORATED

Michael Bahtiarian, INCE Bd. Cert.
Principal Consultant

Cc: Alex Odom; Acentech, Inc.

Attachment: Appendix A - Equipment Octave Band Sound Power Levels

FIGURE 1: Acoustic Model & Property Line Receptors R1 through R5

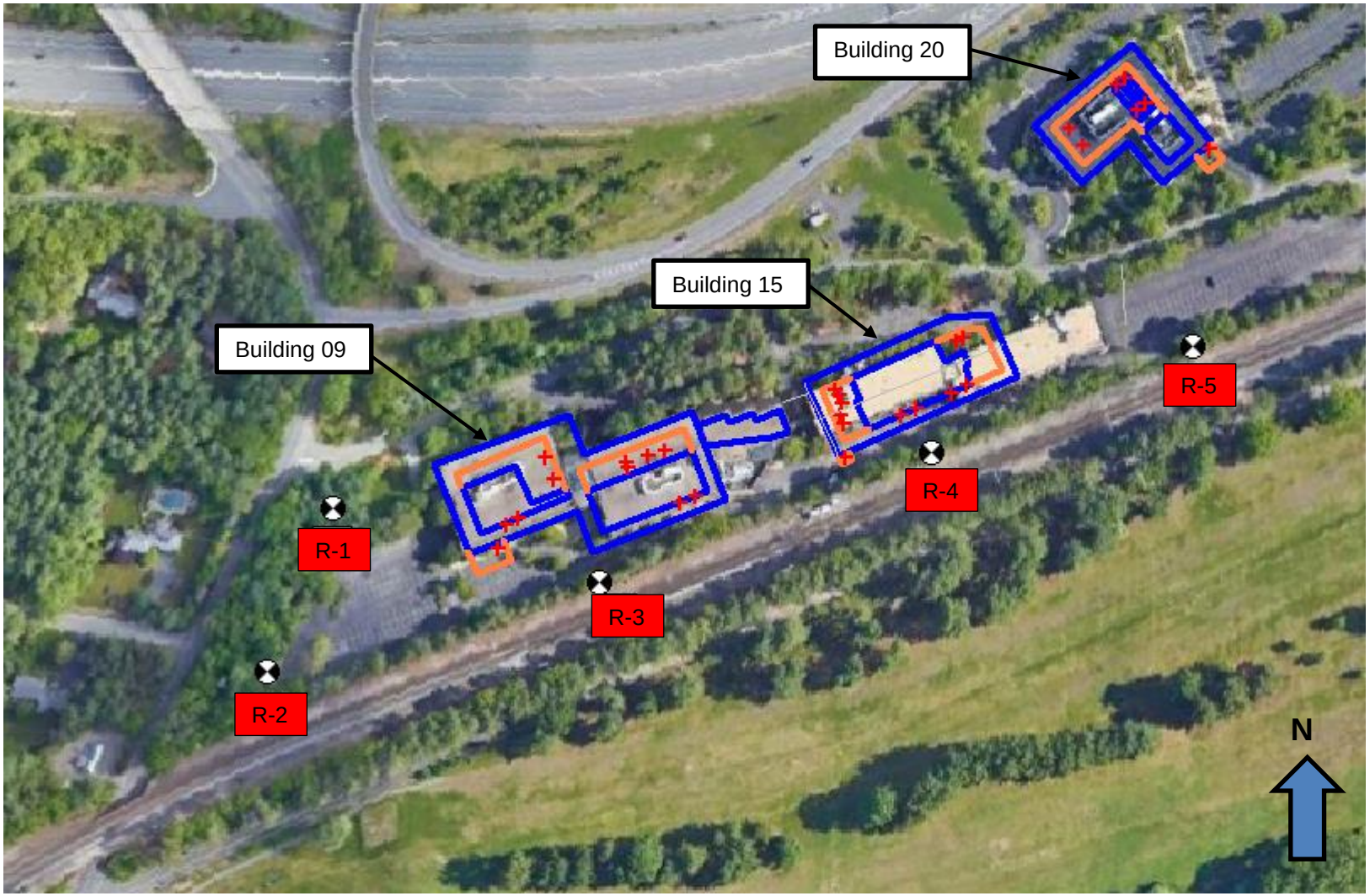
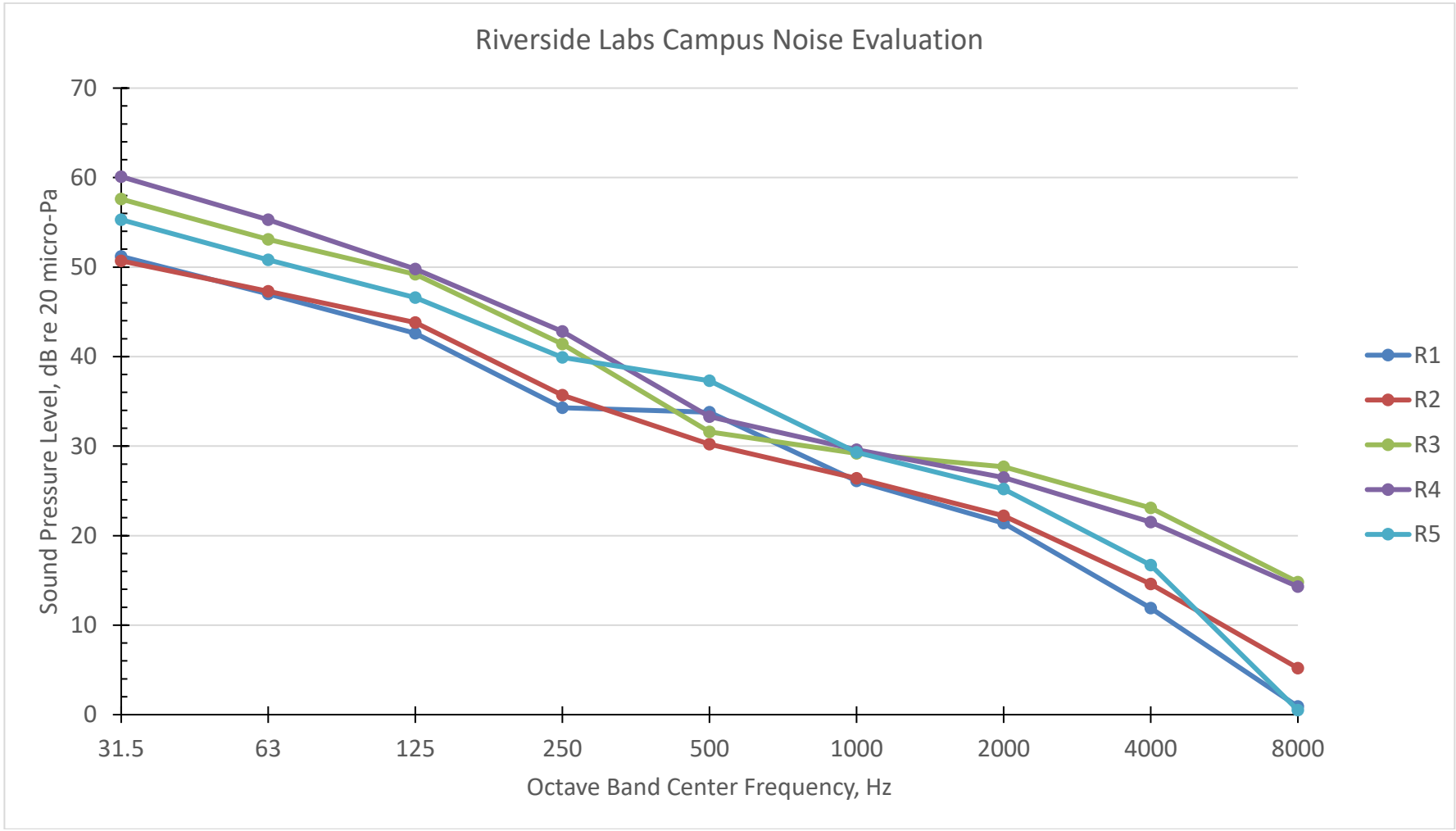


FIGURE 2: Estimated Octave Band Sound Pressure Levels for R-1 through R-5



APPENDIX A – EQUIPMENT OCTAVE BAND SOUND POWER LEVELS

TABLE A-1: Standard Sound Power Levels Provided by the Equipment Vendor

Equipment Tag	Buildings	Sound Power dB re pico-Watt by Octave Band									
		31.5	63	125	250	500	1000	2000	4000	8000	dBA
AHU-1, 2, 3 & 4	B09, B15	85	82	78	82	68	69	70	66	56	77
AHU-1 & 2	B20	102	93	91	98	100	93	92	87	83	100
EAHU-1 with outlet silencers	B09, B15	104	101	100	96	94	92	88	84	80	97
EAHU-2 with outlet silencers	B09, B15	105	102	101	97	95	93	89	85	81	98
EAHU-1 & -2 with outlet silencers	B20	99	96	94	86	73	66	66	67	63	82
Transformer	B09, B15, B20	84	81	78	75	72	69	66	63	60	75

TABLE A-2: Required Sound Power Levels

Equipment Type	Buildings	Sound Power dB re pico-Watt by Octave Band									
		31.5	63	125	250	500	1000	2000	4000	8000	dBA
Cooling Tower with low noise options	B09, B15	101	98	93	87	86	85	83	83	83	91
Caterpillar, C18 w/ high performance enclosure	B09, B15	104	101	91	87	83	77	74	69	71	85

The sound power levels given above have not been provided by any specific vendor. The project team shall procure such equipment with maximum the sound power level as given above.

TABLE A-3: Required Silencer Dynamic Insertion Loss (DIL)

Equipment Type	Buildings	Dynamic Insertion Loss (DIL), dB									
		31.5	63	125	250	500	1000	2000	4000	8000	dBA
EAHU-1 Outlet Silencer	B09, B15	2	2	4	11	18	21	19	15	14	-
EAHU-1 Outlet Silencer	B09, B15	10	10	6	18	25	26	20	16	10	-